

# STS-125 Simulation Educator Answer Key

## **1. Why is there a need to replace the Wide Field Camera used by the Hubble Space Telescope?**

The Wide Field and Planetary Camera currently in use was installed in 1993 and there have been significant advances in technology since that time. In addition to replacing the wide field planetary capabilities, the Wide Field Camera will also add a second channel which will give this camera excellent full-spectrum panoramic imaging capabilities.

[http://www.nasa.gov/mission\\_pages/hubble/servicing/SM4/main/SM4\\_Essentials.html](http://www.nasa.gov/mission_pages/hubble/servicing/SM4/main/SM4_Essentials.html)

## **2. Why was the Corrective Optical Space Telescope Axial Replacement originally needed?**

During the first Hubble Space Telescope servicing mission, COSTAR was installed to optically correct the effects of the primary mirror's aberration on the Faint Object Camera (FOC), the High Resolution Spectrograph (HRS), and the Faint Object Spectrograph (FOS). Since these first generation instruments are no longer used the COSTAR will be removed during STS-125.

[http://www.nasa.gov/mission\\_pages/hubble/servicing/SM4/main/SM4\\_Essentials.html](http://www.nasa.gov/mission_pages/hubble/servicing/SM4/main/SM4_Essentials.html)

## **3. How does the Hubble Space Telescope get its power?**

During Hubble's sunlight (or daytime) orbit, its solar arrays provide power to the electrical components and charge the batteries so they have enough power to support Hubble during its night orbit. Since Hubble spends about one third of its 97 minute orbit around the Earth in the dark it must rely on the energy that is stored in its onboard batteries to supply power to the entire telescope. Due to normal aging and cycling, the telescope's batteries are showing an expected slow loss in capacity, their ability to hold a charge, so they will be replaced during the STS-125 mission.

[http://www.nasa.gov/mission\\_pages/hubble/servicing/SM4/main/Battery\\_FS\\_HTML.html](http://www.nasa.gov/mission_pages/hubble/servicing/SM4/main/Battery_FS_HTML.html)

## **4. What are some of the hazards of spacewalks?**

A primary reason spacewalks are dangerous is collision with space debris. An object as small as 1 millimeter in length is able to cause damage to a spacecraft since it is travelling at speeds up to 7.8 km/sec. Ultraviolet radiation and extreme temperatures of -100 degrees Celsius up to 120 degrees Celsius also pose significant challenges during spacewalks.

[http://www.nasa.gov/audience/forstudents/5-8/features/F\\_What\\_Goes\\_Up\\_5-8.html](http://www.nasa.gov/audience/forstudents/5-8/features/F_What_Goes_Up_5-8.html)

## **5. How is the extreme temperature range encountered during spacewalks solved using science and technology?**

The spacesuit arm has 14 layers of material to protect the spacewalker. There are layers for liquid cooling and ventilation, a layer for proper pressure for the body and holding in the oxygen for breathing, and tear-resistant layers. Seven layers are Mylar insulation and keep the temperature from changing inside. These layers also protect the spacewalker

from being harmed by small, high-speed objects flying through space. The outer layer is made of a blend of waterproof fabric, bullet-proof vest fabric, and a fire-resistant fabric.

*[http://www.nasa.gov/audience/foreducators/spacesuits/home/clickable\\_suit\\_nf.html](http://www.nasa.gov/audience/foreducators/spacesuits/home/clickable_suit_nf.html)*